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***Short Communication***

# IMAGE PROCESSING FOR DETECTION OF ORAL WHITE SPONGE NEVUS LESIONS

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**ABSTRACT: White Sponge Nevus is a rear hereditary disease in human causes incurable white lesions in oral mucosa. Appropriate history, clinical examination along with biopsy and cytological studies are helpful for diagnosis of this disorder. Identification can also be made in alternative way by applying image processing technique using Watershed segmentation with MATLAB software. The applied techniques are effective and reliable for early accurate detection of the disease as alternative of expertise clinical and time taking laboratory investigations.**

**Key words:** Oral White Sponge Nevus, Watershed segmentation, Image processing.

White Sponge Nevus (WSN) is an uncommon hereditary disease characterized by bilateral diffuse, white thickened plaques in buccal mucous membranes (Sanjeeta *et al.* 2016). It is relatively rare developmental anomaly inherited as autosomal dominant trait along with variable phenotypic expression (Aghbali *et al.* 2009). Bumbacae *et al.* (2015) reported WSN cases with a family history of similar lesions in six other members from three generations. Lesions are often presented at birth or at early childhood. In absence of associated signs and symptoms it is incidentally detected but wrongly diagnosed primarily as candidiasis in most of the cases (Sangu *et al.* 2012). It is rear disorder affecting only 1 in 2,00,000 people amongst population (Greenberg *et al.* 2008). Lesions are benign in nature, which may persist throughout the life and there is no evidence of dysplastic changes or predispose to malignant development (Sangu *et al.* 2012). It may be confused with other white lesions in buccal mucosa (Dadlani *et al.* 2008). Detailed history, clinical investigation and biopsy are important

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for confirm diagnosis (Altop *et al.* 2014).An alternative way of approach is true colour image processing with characterization for early detection of the disease for better support of clinical observation and diagnosis of Physician.

**Procedure**

Image processing (IP) is a challenging and most growing research area in diagnostic medical field (Anuradha and Sankaranarayanan 2012). In IP, the goal is to split the image into several parts, called image segmentation with restoration to detect edges makes this operation (Belaid and Mourou 2009). In three stages of segmentation process, the first is to remove useless information from the image. In second is initial object discrimination, in which objects are grossly separated into groups with similar attributes. In third is object boundary clean up and reduced to single-pixel widths (Kour and Verma 2013). The use of watershed algorithm for image segmentation is widespread because it is able to produce a complete division for better processing of images (Ng *et al.* 2008). Segmentation by watershed transform is fast, robust and widely used in image processing and analysis Allaouiand Nasri (2012). The IP techniques were used with watershed segmentation including GLCM texture features extraction for analysis of true color image in MATLAB software computed data with some useful algorithms (Anuradha and Sankaranarayanan 2015; Mitra and Menaka 2016). The watershed algorithm provides a useful method for lesion segmentation (Wang *et al*. 2010). It is an image segmentation algorithm based on the theory of mathematical morphology (Meyer and Beucher 1990). In this study Software tools Matlab 2015b were used. Initially, impute true colour image was taken and processed by different methods like image smoothing, enhancement, segmentation, morphological operation, extracted affected regions and finally characterization was performed (Fig.1).

**Finding of this study**

True colour oral WSN images used here as input images (Fig. 2) for processing, segmentation, feature extraction and characterization. In the initial stage of the study, linear contrast stretching was made to remove noise from true colour images. The velocity was computed after extending linear contrast. Then after smoothing and enhancement of images, segmentation was done using watershed algorithms in the affected portion of improved images.

The minimum value of the lesion areas were extracted by segmentation from input images. The changes in the boundaries, found by divided lines were calculated by using algorithm. In input images at the edge lines, it transforms the catchment basins and watershed edge lines. Images were treated like a plane, where light

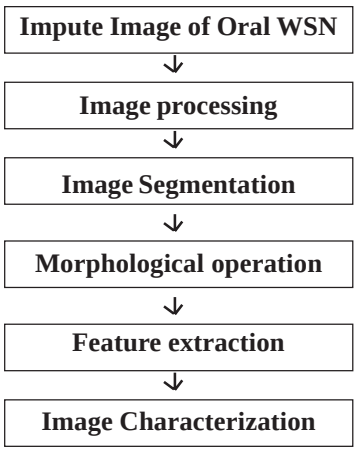


**Fig. 1. Flow Chart of the methodology implemented.**

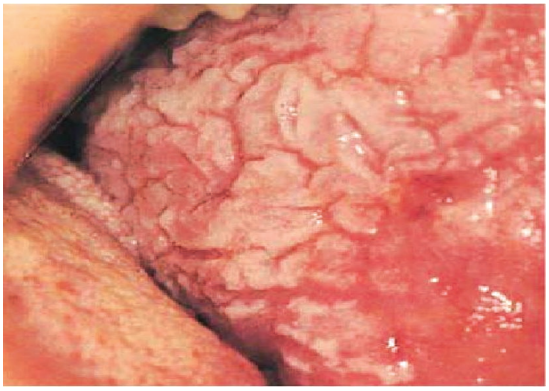

**Fig. 2. Oral White Sponge Nevus.**

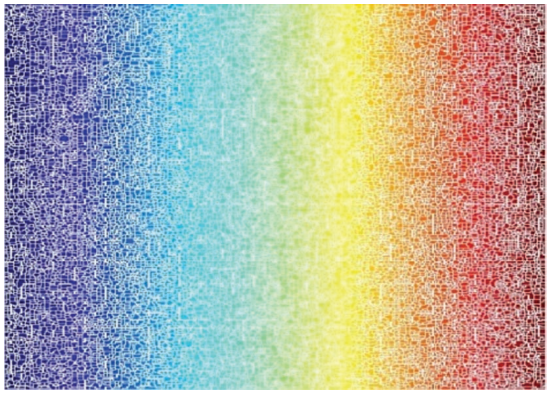

**Fig. 3. Watershed segmented WSN image.**

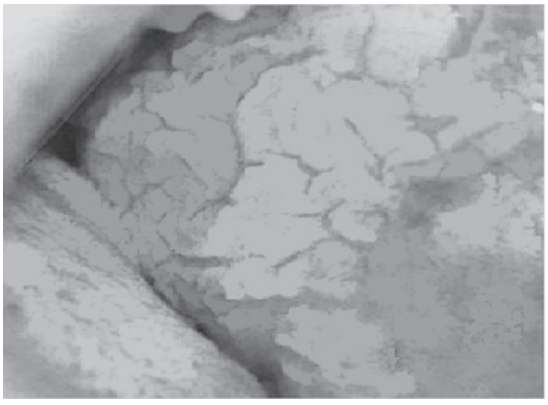

**Fig. 4. Morphological operation of WSN image.**

**Fig. 5. Affected portion extracted from impute image.**

and dark pixels found higher and lower respectively. The segmented output shown in Fig. 3. Morphological operation was done for clearing the segmented images in this study (Fig. 4).

The feature extracted (Fig. 5) during study using Gray Level Co-occurrence Matrix (GLCM), were found the average values *i,e.* Contrast: 0.1668, Correlation: 0.9393, Autocorrelation: 42.5659, Dissimilarity: 0.1589, Energy: 0.3333, Entropy: 1.7152, Homogeneity: 0.9213. The segmentation module was used with proper features extraction for accurate identification of oral WSN.

Quality of images enhanced with proper identification following image processing, segmentation, morphological operation, feature extraction and characterization. In this work, by combining the GLCM features with watershed segmentation gives highly efficient output. Oral lesions can be detect and characterised properly after clinical study, image processing and analysis with the co-relation of extracted features. This analysis system could be further extended for classification of images with differentiation from other types of oral lesions.

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